#49

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 28 1998

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Registration of EthylBloc™ (EPA Symbol. No. 071297-R) containing 0.43% 1-Methylcyclopropene (Chemical No. 224459), a new active ingredient. Review of Product Chemistry and Toxicity Data (Submission No. S548591; Case No. 063215), MRID Nos. 444647-01, -02, -03, -04, -05, -06, -07, -08, -09, -10, and -11; 4451700-01, -02, -03, -04, -05, and -06; and 445676-01 ; DP Barcode D249432.

FROM: Russell S. Jones, Ph.D., Biologist
Biochemical Pesticides Branch
Biopesticides & Pollution Prevention Division (7511C)

THRU: Freshteh Toghrol, Ph.D., Senior Scientist
Biochemical Pesticides Branch
Biopesticides & Pollution Prevention Division (7511C)

TO: Driss Benmhend, Regulatory Action Leader
Biochemical Pesticides Branch
Biopesticides & Pollution Prevention Division (7511C)

ACTION REQUESTED

BioTechnologies for Horticulture, Inc. requests registration of an end-use product, EthylBloc™ (EPA Symbol. No. 071297-R) containing 0.43% 1-Methylcyclopropene (MCP) as its active ingredient; MCP is a new active ingredient. EthylBloc™ is a powdered product that releases a gas (MCP) when mixed with water or a buffering agent. It is intended for non-food use floral and nursery crops.

In support of the registration, the registrant has submitted product chemistry and toxicity studies, a proposed product label, and Confidential Statements of Formula (CSFs) for the basic formulation and one alternate formulation (each dated 11/97). Material Safety Data Sheets (MSDS) were submitted for each of the product ingredients. The registrant did not submit nontarget organism/ecotoxicity studies or request a waiver from the requirements for these studies.

CONCLUSIONS AND RECOMMENDATIONS

1. BPB does not support the registration of EthylBloc™ because of deficiencies in the description of the manufacturing process (151-11), and in the certified limits (151-15) and Confidential Statement of Formula (CSF) for the alternate formulation.

2. The data submitted for product identity and disclosure of ingredients (151-10), the discussion of the formation of unintentional ingredients (151-12), preliminary analysis (151-13), analytical methods (151-16), and physical/chemical properties (151-17) are acceptable. No additional data are required.

3. The description of the manufacturing process (151-11) is unacceptable, but upgradable. For each beginning material used in the manufacturing process, the registrant indicated that an "equivalent" material could be substituted, but none of these equivalent materials were identified. To upgrade the study, the registrant must submit a list of all the beginning materials (and substitutes), MSD sheets, and the names and addresses of all their respective suppliers. The registrant must also indicate when each substitute beginning material may be used in the manufacturing process and the amount of each substitute material that is used.

4. The certified limits (151-15) for an inert ingredient in the alternate formulation are unacceptable, but upgradable. To upgrade the data, the registrant must specify the correct upper and lower limits of the substitute inert ingredient; the currently listed limits are too large. The certified limits for this inert ingredient should be ± 3% of the nominal concentration (by % weight). These data must agree with the information listed on a revised alternate formulation CSF.

5. The registrant must submit a revised CSF for the alternate formulation. The alternate formulation CSF should list only the active ingredient and the substitute inert ingredient that is used in place of the inert listed for the basic formulation. The certified limits for the substitute inert ingredient must be ± 3% of the nominal concentration (see above).

6. No additional data are required for acute mammalian toxicity (152-10 to 152-16). The product is not a sensitizing agent.

7. No additional data are required for mutagenicity (152-19). Based on the data, the product is not a mutagen.

8. No data were submitted for non-target organisms/ecological effects (154-6 to 154-11), but none are required for EthylBloc™. The product is non-food use and is not intended for use outdoors or in other non-enclosed areas. If the registrant intends to use this product (or other products containing MCP as the active ingredient) on food crops/commodities, outdoors and/or in other non-enclosed areas, or in enclosed areas

where non-target insects and plants may be exposed, additional non-target organism/ecological effects studies may be required.

9. A revised label must be submitted (see Label Review below).

STUDY SUMMARIES

Product Chemistry

Product chemistry data (Subdivision M Guidelines 151-10 through 151-17 were presented for EthylBloc™ (MRIDs 444647-01, -02, and -03; 4451700-01, -02, -03, and -04; and 445676-01). The end-use product consists of one basic formulation. The new biochemical active ingredient is1-methylcyclopropene, which comprises 0.43% of the product by weight. The submitted preliminary analysis data were satisfactory. Acceptable certified ingredient limits (by % weight) were reported for the basic formulation, but not for the alternate formulation; the range for the upper and lower certified limits was large. New certified limits for one inert ingredient in the alternate formulation must be submitted and a second inert ingredient must be removed from the ingredients list. A revised alternate formulation CSF must be submitted to reflect these changes. An acceptable GC/FID method for the determination of the active ingredient in the end-use product was presented; precision, accuracy, and limits of detection data were reported, and representative chromatograms were submitted. The data submitted for physical/chemical properties were satisfactory.

Study deficiencies: (i) for each beginning material used in the manufacturing process (151-11), the registrant indicated that an "equivalent" material could be substituted, but none of these equivalent materials were identified; (ii) the range for the certified ingredient limits (151-15) for inert ingredients in the alternate formulation were incorrect; and (iii) an inert ingredient from the basic formulation was incorrectly listed on the alternate formulation CSF.

Classification: Unacceptable, but upgradable. To upgrade the study, the registrant must resolve the product chemistry deficiencies described above.

Toxicology

The registrant submitted acceptable acute toxicity studies (152-10 to 152-16) and mutagenicity studies (152-19) for EthylBloc™. Based on a lack of mortality observed in albino rats orally dosed with 5000 mg/kg of powdered product, the oral LD_{50} was >5000 mg/kg; tox category IV. Based on a lack of mortality observed in albino rabbits dermally dosed with 2000 mg/kg of powdered product, the LD_{50} was >2000 mg/kg; tox category III. Based on a lack of mortality observed in albino rats exposed to165 ppm of MCP gas for 4 hours, the LC_{50} was >165 ppm; tox category IV. Ocular instillation of 0.1 mL of powdered product caused mild to moderate eye irritation symptoms (redness, chemosis) which cleared by 72 hours posttreatment; tox category

III. Dermal application of 0.5 g of powdered product did not cause any dermal irritation symptoms up to 72 hours postdosing; tox category IV. Based on the data, the test substance is not considered to be a contact sensitizer. No hypersensitivity incidents have been reported. Approximately 4100 person hours of MCP exposure have been experienced by humans without any known MCP-induced health related problems being reported. Based on a lack of statistically significant data obtained from a reverse-mutation assay study a mouse lymphoma forward mutation study assay, and a mouse micronucleus study, MCP is not considered a mutagen.

Classification: Acceptable; no additional data are required.

LABEL REVIEW

General: The signal word "CAUTION" that is listed on the proposed label is appropriate.

Toxicity: Acute toxicity studies demonstrate that the active ingredient should be classified in Toxicity Category III for acute dermal toxicity and primary eye irritation (Subdivision M Guidelines 152-11 and 152-13, respectively). Therefore, the product label must contain a Precautionary Statement and First Aid (Statement of Practical Treatment) statements appropriate for these toxicity categories. Appropriate label statements (obtained from the Label Review System) are attached.

cc: F. Toghrol, R. S. Jones, R. Kumar, BPPD Subject File
R. S. Jones: F.T. CM2, (703) 308-5071: 12/23/98

ATTACHMENT

Label Precautionary Statements and First Aid (Statement of Practical Treatment) Statements

CONFIDENTIAL APPENDIX

The Following Section Contains Confidential Business Information (CBI)

DATA EVALUATION REPORT

Primary Reviewer: Russell S. Jones, Ph.D., BPPD
Secondary Reviewer: Freshteh Toghrol, Ph.D., BPPD

STUDY TYPE:	Product Chemistry (Subdivision M Guidelines 151-10 to 151-17)
TOX. CHEM. No.:	None
CASE No.	063215
PC CODE:	224459
DP BARCODE:	D249432
SUBMISSION No.:	S548591
MRID Nos:	444647-01 to -03; 445170-01 to -04; and 445676-01
TEST MATERIAL:	EthylBloc™
STUDY Nos.:	3454-97 (MRID 445170-04); No study numbers for all other MRIDs
SPONSOR:	BioTechnologies for Horticulture, Inc., 122 Tower Drive, Burr Ridge, IL 60521
TESTING FACILITIES:	Stillmeadow, Inc., 12852 Park One Drive, Sugar Land, TX 77478 (MRID 445170-04); None (MRID 445676-04); and BioTechnologies for Horticulture, Inc., 122 Tower Drive, Burr Ridge, IL 60521 (all other MRIDs).
TITLE OF REPORTS:	Product Identity and Disclosure of Ingredients for 1-Methylcyclopropene (MCP; MRID 445170-01); Manufacturing Process for Methylcyclopropene (MCP; MRID 444647-01); Discussion of the Formation of Unintentional Ingredients in Ethylbloc: Methylcyclopropene (MCP; MRID 445170-02); Preliminary Analysis of Methylcyclopropene (MCP; MRID 444647-02); Certification of Ingredient Limits for EthylBloc™ (MRID 445170-03); and Analytical Method for Certified Limits of Methylcyclopropene (MCP; 444647-03); and EthylBloc (MCP): Product Chemistry for Non-Combustible End-Use Solids (MRID

445170-04); Physical and Chemical Properties of EthylBloc® - Part II (MRID 445676-01).

AUTHORS: Jim Daly (MRIDs 445170-01 to -03 and 444647-03; Bob Kourelis MRIDs 444647-01 and -02); Jerry Bennick (MRID 445170-04); and Amy Plato Roberts (MRID 445676-01).

REPORT ISSUED: Reports were issued between 9/97 and 11/97, except for MRID 445676-01 which was issued in 5/98.

QUALITY ASSURANCE: None of the studies, except for MRID 445170-04, were conducted under Good Laboratory Practices (GLP) guidelines because the studies were discussions and or summaries that contained no scientific data. Statements of compliance and non-compliance were signed by the study authors and representatives/agents for the study sponsor

SUMMARY: Product chemistry data (Subdivision M Guidelines 151-10 through 151-17 were presented for EthylBloc™. The end-use product consists of one basic formulation and one alternate formulation. The active ingredient is1-methylcyclopropene (MCP), which comprises 0.43% of the product by weight. The inert ingredient [redacted] is present in the basic formulation at [redacted] by weight. In % by weight, the following inert ingredients are present in the alternate formulation: [redacted] A five batch analysis for the product was submitted and was acceptable. The following certified ingredient limits for the basic formulation (by % weight) were reported by the registrant: MCP (0.43 to 0.47 %) and [redacted] The following certified ingredient limits for the alternate formulation (by % weight) were reported: MCP (0.43 to 0.47 %); [redacted] The range between the upper and lower limits are too large. NOTE: The registrant apparently intends to substitute [redacted] for [redacted] in the alternate formulation, but listed both ingredients on the alternate formulation CSF. An acceptable GC/FID method for the determination of the active ingredient in the end-use product was presented; information regarding precision, accuracy, and limits of detection for the method were satisfactory. The end-use product is a fine, white powder with a faint, sweet odor. It has a specific gravity of approximately 0.634 g/mL at 25°C and a melting point of approximately 300°C. The product is soluble in water (152 g/L). It has a pH of 3.92 (5.02% w/v in water). It does not contain oxidizing or reducing agents, is not potentially explosive, is not corrosive, is stable under normal use conditions, and stable under normal storage conditions for a minimum of one year.

CLASSIFICATION: Unacceptable, but upgradable.

Inert ingredient information may be entitled to confidential treatment

I. PRODUCT IDENTITY AND DISCLOSURE OF INGREDIENTS (151-10); MRID 44517001

Basic Formulation

A. 1-Methylcyclopropene (MCP)

Ingredient:	Active
CAS Number:	3100-04-7
Empirical Formula:	C10 H18 O
Chemical Characterization:	Plant growth regulator
Supplier:	Made onsite

B. [redacted]

Alternate Formulation

A. 1-Methylcyclopropene (MCP)

Ingredient:	Active
CAS Number:	3100-04-7
Empirical Formula:	C4 H6
Molecular Weight:	54
Chemical Characterization:	Plant growth regulator
Supplier:	Made onsite

B. [redacted]

[redacted]

C. [redacted]

NOTE: The above information for the alternate formulation was obtained from the alternate formulation CSF, dated 11/97.

II. MANUFACTURING PROCESS (151-11; MRID 44464701)

[redacted]

Manufacturing process information may be entitled to confidential treatment

III. DISCUSSION OF THE FORMATION OF IMPURITIES (151-12); MRID 44517002

The registrant presented a discussion of the potential for the formation of approximately contaminants that may theoretically be formed during the manufacturing process.

[redacted]

Manufacturing process information may be entitled to confidential treatment

[redacted]

Representative chromatograms for MCP and its potential contaminants were also submitted.

IV. PRELIMINARY ANALYSIS (151-13; MRID 44464702)

Data obtained from a five batch analysis are presented in the table below.

Lot Number	% MCP in Sample
F5174	0.445
F5172	0.423
F5181	0.447
F5171	0.462
F5177	0.422
Mean ± s.d.*	0.440 ± 0.017*

*Standard deviation (calculated by the reviewer)

Precision, accuracy, and limits of detection data are discussed in Enforcement Analytical Method (below).

V. CERTIFICATION OF INGREDIENTS (151-15) MRID 44517003

The nominal concentrations and certified ingredient limits (by % weight) for the basic formulation were as follows:

Ingredient	Nominal Concentration*	Certified Limits (% by weight)*	
	% by weight	Upper	Lower
1-Methylcyclopropene	0.43	0.47	0.39
[redacted]			

*CSF dated 11/97

The basic formulation contains [redacted] However, the registrant stated that they wished to substitute one inert for another in the alternate formulation, on an as needed basis, depending upon price and availability. The nominal concentrations and certified ingredient limits (by % weight) for the alternate formulation were as follows:

Ingredient	Nominal Concentration*	Certified Limits (% by weight)*	
	% by weight	Upper	Lower
1-Methylcyclopropene	0.43	0.47	0.39
[redacted]			

*CSF dated 11/97

The registrant should only list the alternate inert ingredient [redacted] on the alternate CSF, and remove the inert [redacted] Additionally, the values for the nominal concentration and certified limits for [redacted] in the alternate formulation should be identical to the values for the inert listed in the basic formulation. The alternate CSF must be revised accordingly.

VI. ANALYTICAL METHODS (151-16) MRID 44464703)

The registrant submitted a GC/FID method for the determination of the active ingredient in the end-use product. Samples (0.5 g) of EthylBloc™ prepared for analysis by dissolving in 5 mL of an aqueous solution containing 0.9% KOH and 0.9% NaOH in a sealed GC vial. The samples are shaken for 30 seconds, placed in a 60°C water bath for 12 minutes, and equilibrated to room temperature for 60 minutes. The headspace gas from three samples (reps) from each batch are then analyzed by GC/FID on an AT-1 column or a column packed with modified alumina F-1. Since there are no certified MCP standards available, ethylene (1000 to 5000 ppm) is used as an external standard. The MCP peak area is quantified by multiplying it by a correction factor of 1.23 before the MCP area is compared to the ethylene peak area. This correction factor was determined by comparing the mass ions of a known ethylene concentration with MCP using GC/MS techniques. To confirm that the largest peak on the chromatogram was MCP, 2.0 mL of headspace gas was injected into a septum-sealed vial containing deionized water and iodine chips; after 30 minutes a sample was analyzed by GC/FID. Since iodine vapor will react with MCP, but not with CMP, the presence of MCP can be demonstrated by its disappearance by comparison of the MCP/CMP peak ratios. Based on the data obtained from the five batch preliminary analysis (see above) the method is accurate; mean MCP

concentration of the five batches was 0.440 ± 0.017 %. The precision of the method is ± 6.0%. The analytical limit of detection for MCP is 10 ppb

VII. PHYSICAL AND CHEMICAL CHARACTERISTICS (151-17); MRIDs 44517004 and 44567601

Property	End-use Product (EP)
Color	White
Physical state	Powder
Odor	Faint, sweet
Melting point	>300°C (572°F); color change from white to brown at approximately 260°C.
Boiling point	Not applicable (NA)
Specific gravity	0.634 g/mL at 25°C
Solubility	152 g/L water
Vapor pressure	NA
Dissociation constant	NA
Octanol/water partition coefficient	NA
pH	3.92 (in 5.02% aqueous solution)
Oxidation/reduction potential	None
Explodability	Not explodable
Stability	Stable between 0 and 37°C, under artificial sunlight, and in aqueous solution
Flammability	Not specified
Storage stability	Not specified
Viscosity	NA
Miscibility	NA
Corrosion characteristics	Not corrosive
Dielectric breakdown voltage	NA

DISCUSSION

The product identity and disclosure of ingredients were adequately described. However, the manufacturing process was not sufficiently explained; substitute ingredients used in the manufacturing process were not identified. The discussion of the formation of unintentional ingredients was satisfactory. The submitted preliminary analysis data were acceptable. The certified ingredient limits for the basic formulation were acceptable, but the range between the upper and lower certified limits for the inert ingredients in the alternate formulation was too large, and therefore, unacceptable. An acceptable GC/FID analytical method was submitted for the determination of the active ingredient in the end-use product. The submitted physical/chemical properties table was satisfactory. The alternate formulation CSF was unacceptable because the range between the upper and lower certified limits for the substitute inert ingredient were too large. Additionally, the inert ingredient used in the basic formulation was listed on the alternate formulation CSF.

STUDY DEFICIENCIES

For each beginning material used in the manufacturing process, the registrant indicated that an "equivalent" material could be substituted, but none of these equivalent materials were identified. To upgrade the study, the registrant must submit a list of all the beginning materials, MSD sheets, and the names and addresses of their respective suppliers. The registrant must also indicate when each substitute beginning material may be used in the manufacturing process and the amount of each substitute material that is used. The range between the upper and lower certified limits (151-15) for inert ingredient, [redacted] in the alternate formulation are too large; certified limits for this inert ingredient should be ± 3% of the nominal concentration (by % weight). The inert ingredient [redacted] from the basic formulation was incorrectly listed on the alternate formulation CSF, and must be removed.

Inert ingredient information may be entitled to confidential treatment

DATA EVALUATION REPORT

STUDY TYPE:	Toxicology Studies; Guideline Nos. 152-10 through 152-17
MRID Nos:	444647-04 to -11; 445170-05 and -06
TEST MATERIAL:	EthylBloc™
STUDY Nos.:	96G-2086 to -2089 (MRIDs 444647-04, -05, -07 and -08; and 445170-05); 96G-2139 (MRID 444647-09); 3333-97 (4444647-06); 18384-0-431 (MRID 444647-10); 18384-0-455 (MRID 444647-11); and None (MRID 445170-06).
SPONSOR:	BioTechnologies for Horticulture, Inc., 122 Tower Drive, Burr Ridge, IL 60521
TESTING FACILITIES:	Technologies for Horticulture, Inc., 120 Tower Drive, Burr Ridge, IL 60521 (445170-06); Covance Laboratories Inc., 9200 Leesburg Pike, Vienna, VA 22182 (MRIDs 444647-10 and -11); Stillmeadow, Inc., 12852 Park One Drive, Sugar Land, TX 77478 (444647-06); and Toxikon Corporation, 15 Wiggins Avenue, Bedford, MA 01730 MRIDs 444647-04 to -09; and 445170-05)
TITLE OF REPORTS:	Acute Oral Toxicity (MRID 444647-04); Acute Dermal Toxicity (Single Exposure; MRID 444647-05); Acute Inhalation Toxicity Study in Rats (MRID 44464706); Primary Eye Irritation Study (MRID 444647-07); Primary Dermal Irritation - FIFRA (MRID 444647-08); Buehler Sensitization Test (MRID 445170-05); Hypersensitivity Incidents Report (MRID 445170-06); *Salmonella Typhimurium* Reverse Mutation Assay - FIFRA (MRID 444647-09);Mutagenicity Test on MCP in the L5178Y TK +/- Mouse Lymphoma Forward Mutation Assay (MRID 444647-10); and Mutagenicity Test on MCP in an *In Vivo* Mouse Micronucleus Assay (MRID 444647-11).
AUTHORS:	Richard Pfeifer, Ph.D., D.A.B.T. (MRIDs 444647-04, -05, and -08; and 445170-05); Jerry E. Bennick (MRID 444647-06); Joseph A. Prezioso, Ph.D. (MRID 444747-07 and -09); Jim Daly (MRID

445170-06); Maria A. Cifone, Ph.D. (MRID 444647-10); and James L. Ivett, Ph.D. (MRID 444647-11).

REPORT ISSUED: Reports were issued between 12/96 and 10/97

QUALITY ASSURANCE: All of the submitted studies were conducted according to Good Laboratory Practices (GLPs), except MRID 44517006 (Hypersensitivity Incidents). Compliance statements were signed by the study authors and/or company agents.

SUMMARY: The registrant submitted acceptable acute toxicity studies (152-10 to 152-16) and mutagenicity studies (152-19). Based on a lack of mortality observed in albino rats orally dosed with 5000 mg/kg of test substance, the oral LD_{50} is >5000 mg/kg; tox category IV. Based on a lack of mortality observed in albino rabbits orally dosed with 2000 mg/kg of test substance, the LD_{50} is >2000 mg/kg; tox category III. Based on a lack of mortality observed in albino rats exposed to 165 ppm of test substance for 4 hours, the LC_{50} >165; tox category IV. Ocular instillation of 0.1 mL MCP caused mild to moderate eye irritation symptoms (redness, chemosis) which cleared by 72 hours posttreatment; tox category III. Dermal application of 0.5 g of MCP did not cause any dermal irritation symptoms up to 72 hours postdosing; tox category IV. Based on the data, the test substance is not considered to be a contact sensitizer. No hypersensitivity incidents have been reported. Approximately 4100 person hours of MCP exposure have been experienced by humans without any known MCP-induced health related problems being reported. Based on a lack of statistically significant data obtained from a reverse-mutation assay study a mouse lymphoma forward mutation study assay, and a mouse micronucleus study, MCP is not considered a mutagen.

CLASSIFICATION: Acceptable; no additional data are required for acute mammalian toxicity and mutagenicity.

I. ACUTE ORAL TOXICITY IN RATS (Limit Test); §152-10 (MRID 44496108).

A. MATERIALS

Test Compound

Test substance:	EthylBloc (MCP); purity not specified, but is 0.43% a.i. according to the CSF (dated 11/97)
Lot No.:	F2428-31
pH	Not applicable (NA)
Physical description:	White powder

Storage Conditions:	Room temperature
Dose level:	5000 mg/kg body weight
Controls:	None
Test animals:	Sprague-Dawley albino rats
Source:	Charles River Breeding Laboratories, Wilmington, MA
Age/Weight:	49-74 days old/200-300 g; weight variation did not exceed ± 20% of the mean weight for each sex.
No. of animals:	10 (five male, five female)
Acclimitation:	5 days
Housing:	Group-housed in polycarbonate cages (5/cage/sex)
Identification:	Ear tags
Food:	Commercial ration supplied *ad libitum*
Water:	Tap water supplied *ad libitum*
Temperature:	68 ± 5 °F
Photoperiod:	12 hour light/dark cycle

B. TEST PERFORMANCE

Selection: Animals collected from a larger population and examined for a lack of adverse clinical signs of toxicity.

Dosing: Each rat received 5000 mg/kg of test substance by gavage. After dosing each animal was returned to its respective cage and feed and water was supplied *ad libitum*. Food and water were withheld 24 hours prior to administration of the test substance.

Observation: Rats were weighed prior to administration of the test substance and again on days 7 and 14 postdosing. The animals were also observed for mortality and gross toxicity at 0, 7, and 14 days postdosing

Necropsy: All rats were euthanized by CO_2 inhalation on day 14 and gross necropsies were performed on all animals.

C. RESULTS

Clinical Observations: All animals survived, gained weight, and were active and healthy throughout the study. There were no observable signs of gross toxicity, adverse pharmacological effects, or abnormal behavior. All necropsies were negative.

Necropsy (EP and TGAI): The lungs of all rats were moderately red. This symptom is typical of animals euthanized via CO_2 inhalation. All other tissues and organs appeared normal.

D. STUDY DEFICIENCIES

Percentage of active ingredient in the test substance was not reported.

E. CONCLUSIONS

No additional data are required for acute oral toxicity (152-10). Based on a lack of mortality observed in albino rats orally dosed with 5000 mg/kg of test substance, the LD_{50} is estimated to be >5000 mg/kg for methylcyclopropene. Classification: Acceptable; Tox category IV.

II. ACUTE DERMAL TOXICITY IN RATS (Limit Test); §152-11 (MRID 444664705)

A. MATERIALS

Test Compound

Test substance:	EthylBloc (MCP); purity not specified, but is 0.43% a.i. according to the CSF (dated 11/97)
Lot No.:	F2428-31
pH	Not applicable (NA)
Physical description:	White powder
Storage Conditions:	Room temperature
Dose level:	2000 mg/kg
Controls:	None
Test animals:	New Zealand albino rabbits
Source:	Eastern Rabbit Breeding, Taunton, MA
Age/Weight:	10 to 12 weeks/2.0-3.0 kg.
No. of animals:	10 (five male, five female) each for EP and TGAI
Acclimitation:	15 days
Housing:	Individually housed in suspended steel cages
Identification:	Cage cards and ear tags
Food:	Purina Rabbit Chow #5326
Water:	Filtered tap water supplied *ad libitum* via an automated dispenser
Temperature:	68 ± 5°F
Relative humidity:	30-70%
Photoperiod:	12 hour light/dark cycle

B. TEST PERFORMANCE

Dosing: Experimental rats were prepared by clipping fur from their trunks approximately 2 hours prior to dosing. The test substance was applied

uniformly to the shaved areas under two single layers of gauze patches. The gauze was held in place with Vetrap semi-occlusive bandage. At 24 hours postdosing, test substance was removed with water.

Observation: Body weights were recorded prior to dosing and at 7 and 14 days postdosing. The rats were observed for signs of gross toxicity and behavioral changes just following dosing, at 4 hours postdosing, and at least once daily for 14 days.

Necropsy: All rats were euthanized by sodium pentobarbital on day 14 and gross necropsies were performed on all animals.

C. RESULTS

Clinical Observations: All animals survived and gained weight throughout the observation period and there were no signs of toxicity. All necropsies were negative.

D. STUDY DEFICIENCIES

Percentage of active ingredient in the test substance was not reported.

E. CONCLUSIONS

No additional data are required for acute dermal toxicity (§152-11). Based on a lack of mortality observed in albino rabbits orally dosed with 2000 mg/kg of test substance, the LD_{50} is estimated to be >2000 mg/kg for methylcyclopropene. Classification: Acceptable: Tox category III.

III. ACUTE INHALATION TOXICITY (Limit Test); §152-12 ; (MRID 44464706)

A. MATERIALS

Test Compound

Test substance:	EthylBloc (MCP); purity not specified, but is 0.43% a.i. according to the CSF (dated 11/97)
Lot No.:	Not specified
pH	Not applicable (NA)
Physical description:	Fine white powder
Storage Conditions:	Room temperature
Reference standard:	1002 ppm ethylene in nitrogen
Test animals:	Sprague-Dawley albino rats

Age/Weight:	8-12 weeks/males, 323-380 g; females, 196-234 g.
No. of animals:	10 (five male, five female)
Housing:	Individual cages
Identification:	Cage cards and ear tags
Food:	Purina Rodent Chow #5008 *ad libitum*, except during the exposure period.
Water:	Tap water supplied *ad libitum* via an automated dispenser, except during the exposure period.
Photoperiod:	12 hour light/dark cycle
Acclimation:	16-17 days
Housing:	Rats were individually housed in stainless steel cages
Food:	Purina Rodent Chow #5012
Water:	Tap water *ad libitum* via an automatic dispenser (except during exposure)
Temperature:	72 ± 5 °F
Relative humidity:	30-80%
Selection:	Just prior to exposure, all rats were examined for health and weighed.

B. TEST PERFORMANCE

Exposure Chamber:	A 15.5 L nose-only, stainless-steel, dynamic flow chamber. The body of the chamber has 16 ports in 3 rows, with an inlet opening in the front and an outlet chamber at the rear. Tubes containing the test animals are tightly fitted into the ports and sealed with "O" rings.
Test atmosphere generation:	Powdered test substance (52 g) dissolved in water (1.3 L) is placed into a glass nebulizer and heated to 40 °C to produce a gas. The gas was then introduced into the test chamber via an air flow. During exposure, a pressure/vacuum pump system was connected to the chamber which removed the gas from the rear and recirculated the gas to the opposite end. The oxygen content of the chamber was maintained at least 19%. Final concentration of the gas was 165 ppm.
Exposure period:	4 hours. Individually-housed rats were exposed to the test atmosphere when 99% concentration of the test atmosphere was achieved. All animals were returned to their respective cages at the end of the exposure period. Gas samples were analyzed by GC/FID and test substance was quantified based on an ethylene standard.

Exposure monitoring:	Samples were obtained from the breathing zone of the animals three times during exposure
Observation:	Rats were observed for signs of gross toxicity and clinical behavior changes on the day of exposure and once daily for 14 days. Body weights were recorded prior to exposure, and on days 7 and 14 (prior to necropsy) of the observation period.
Necropsy:	All rats were euthanized by intraperitoneal injection of Fatal Plus® on day 14 and gross necropsies were performed.

C. RESULTS

Clinical Observations

All animals survived the exposure period and 14-day observation period, and gained weight during the study. All of the rats exhibited fur coated with feces/urine from 4.5 to 6.0 hours post exposure; these symptoms cleared by 1 day post exposure. All rats exhibited piloerection (very slight to slight) from 6 hours to 3 days post exposure, then the symptoms cleared. The rats remained active and healthy for the remainder of the study.

Necropsy

Necropsies were negative.

D. CONCLUSION

No additional data are required for acute inhalation toxicity (152-11). Based on a lack of mortality observed in albino rats exposed to 165 ppm of test substance in the atmosphere for 4 hours, the LC_{50} is estimated to be >165. Classification: Acceptable; Tox category IV.

E. DEFICIENCIES

None

IV. PRIMARY EYE IRRITATION; §152-13 (MRID 44464707)

A. MATERIALS

Test Compound

Test substance:	EthylBloc (MCP); purity not specified, but is 0.43% a.i. according to the CSF (dated 11/97)
Lot No.:	Not specified
Physical description:	Powder (100% water soluble at ambient temperature)
Storage Conditions:	Room temperature
Controls:	None
Test animals:	New Zealand albino rabbits
Source:	Eastern Rabbit Breeding, Taunton, MA
Age/weight:	10 to 12 weeks/2 to 3 kg
No. of animals:	6 (three male, three female)
Acclimitation:	5 days
Dose level:	0.1 mL of undiluted test substance instilled into the conjunctival sac of the left eye.
Controls:	Untreated right eye of the same rabbit.
Housing:	Individually housed in suspended steel cages
Identification:	Ear tattoo
Food:	Agway Pro-Lab Rabbit Chow, *ad libitum*
Water:	Tap water, *ad libitum*
Temperature:	68 ± 5 °F
Relative humidity:	30 to 70 %
Photoperiod:	12 hour light/dark cycle

B. TEST PERFORMANCE

Dosing:	Prior to dosing, both eyes of each rabbit were examined to ensure they were free of irritation, defects, or injury. The experimental rabbits were then dosed by instillation of 0.1 mL of undiluted test substance into the conjunctival sac of the left eye of each rabbit; the left eye remained untreated and served as a control. At 24 hours postdosing, treated and control eyes were rinsed with 0.9% sodium chloride
Observation:	Ocular irritation was evaluated at 1, 24, 48, and 72 hours postdosing. Eyes were examined with fluorescein dye to verify the absence of corneal damage. The rabbits were weighed once daily during the experimental period.

Necropsy: None

C. RESULTS

Clinical Observations: All animals survived and gained weight during the study period. There was no evidence of toxicity, pain or suffering

Ocular Scoring: No symptoms of opacity or iritis were observed in any of the six rabbits throughout the study period. Two of six animals exhibited conjunctival redness at 24 hours postdosing; redness cleared by 48 hours postdosing. Chemosis was observed in the eyes of four of six rabbits at 1 hour postdosing, and persisted in one rabbit to 48 hours postdosing, then cleared. All symptoms cleared by 72 hours postdosing.

D. STUDY DEFICIENCIES

None

E. CONCLUSIONS

No additional data are required for primary eye irritation (152-13). Ocular instillation of 0.1 mL of undiluted 9, 10-Anthraquinone Liquid Flowable caused mild to moderate eye irritation symptoms (redness, chemosis) which cleared by 72 hours posttreatment. Classification: Acceptable; tox category III.

V. PRIMARY DERMAL IRRITATION; 152-14 (MRID 44464708).

A. MATERIALS

Test Compound

Test substances:	EthylBloc (MCP); purity not specified, but is 0.43% a.i. according to the CSF (dated 11/97)
Lot No.	Not specified
Physical description:	White powder (100% soluble in water at ambient temperature)
Storage Conditions:	Room temperature
Controls:	None
Test animals:	New Zealand albino rabbits
Source:	Eastern Rabbit Breeding, Taunton, MA
Age/weight:	10 to 12 weeks/2 to 3 kg
No. of animals:	6 (three male, three female)

Acclimitation:	Minimum of 5 days
Housing:	Individually housed in suspended steel cages
Identification:	Ear tattoo or marker
Food:	Commercial ration, *ad libitum*
Water:	Tap water supplied *ad libitum*
Temperature:	68 ± 5°F
Relative humidity:	30 to 70 %
Photoperiod:	12 hour light/dark cycle

B. TEST PERFORMANCE

Dosing: Experimental rabbits were prepared by clipping fur from the trunk 24 hours prior to dosing. The test substance (0.5 g slightly moistened with water) was applied evenly over a 6 cm^2 dose area and covered with a gauze pad. The gauze pad and entire trunk of each rat was wrapped with a semi-occlusive bandage. An untreated area of bare skin served as the control. At 4 hours postdosing, residual test substance was removed with water or an appropriate solvent.

Observation: The rabbits were observed for signs of erythema and edema within 30 to 60 minutes of patch removal, and 24, 48, and 72 hours after removal of the bandage.

Necropsy: None

C. RESULTS

Clinical Observations: All animals survived and gained weight throughout the observation period. There were no signs of gross toxicity.

Dermal Irritation Scoring: No erythema or edema was observed at any treated site throughout the observation period.

D. STUDY DEFICIENCIES

None

E. CONCLUSIONS

No additional data are required for primary dermal irritation (152-14). Dermal application of 0.5 g of test substance did not cause any dermal irritation symptoms up to 72 hours postdosing. Classification: Acceptable; Toxicity Category IV.

VII. DERMAL SENSITIZATION; 151-15 (MRID 44517005)

A. MATERIALS

Test Compound

Test substance:	EthylBloc (MCP); purity not specified, but is 0.43% a.i. according to the CSF (dated 11/97)
Lot No.	F2428-31
Physical description:	White powder
Storage Conditions:	Room temperature
Positive control substance:	1-chloro-2,4-dinitrobenzene (DCNB)
Lot No	CSC-95-02-002-VIV
Source.	Sigma Chemical Co., St. louis, MO
Test animals:	Hartley albino Guinea pigs
Source.	Incorrectly listed
Age/weight	Adult (21 to 67 days)/250 to 500 g .
No. of animals:	28 (in 4 test groups): 14 Males,14 females

Preliminary Irritation:	4 (2 male 2 female);	used to determine the highest non-irritant dose for the Challenge Dose.
Test group:	10 (5 male 5 female)	
Negative control group:	10 (5 male 5 female)	
Positive control group:	4 (2 male 2 female)	

Acclimitation:	Minimum of 5 days
Housing:	Individually housed in suspended steel cages
Identification:	Ear tags
Food:	Incorrectly listed; supplied *ad libitum*
Water:	Tap water supplied, *ad libitum*
Temperature:	68 ± 5°F
Relative humidity:	30 to 70 %
Photoperiod:	12 hour light/dark cycle

B. TEST PERFORMANCE

Dosing: Preliminary Irritation Testing: Experimental Guinea pigs were prepared by clipping and shaving, or depilating fur from an area on their left shoulder (3- x 4-cm). The test substance was diluted with water to provide 10%, 25%, 50%, and 100% solutions; one solution each was applied to a single test animal via the closed patch technique; the exposure period was six hours. Twenty-four hours after exposure, each site was evaluated for irritation. Based on these results, the maximum non-irritant concentration was 25% and the minimum irritant concentration was 50%.

Definitive Study: The animals were prepared as described above. In the Induction Phase, the test substance (0.4 mL) was applied directly to the skin of each Guinea pig via a Finn Chamber once weekly for three weeks on one side of the animal. Each exposure was for 6 hours; following exposure, residues were washed from the skin with water. The test animals were observed for dermal irritation symptoms at 24, 48, and 72 hours post exposure each week. Induction scoring was conducted at 24 hours postdosing. In the Challenge Phase, the backs (4- x 3-cm area) of each Guinea pig was shaved 24 hours prior to dosing on Week 5 of the study. The test substance was applied using a Finn Chamber and exposure was for 6 hours. At 24 hours postdosing, the whole back was shaved; at 2 hours after shaving, the test site was evaluated for erythema and edema. The evaluations were repeated at 48 and 72 hours postexposure. Guinea pigs in the positive control group were treated as described above, except that they were exposed to 4 mL of 0.1% DCNB (in 95% aqueous ethanol) in the Induction Phase and 0.05% DCNB (in ethanol) in the Challenge Phase.

C. RESULTS

All animals survived and gained weight throughout the study. There were no signs of gross toxicity.

Induction Phase: Six of ten animals exhibited slight erythema at week 1, four at week 2, and five at week 3.

Positive controls (DNCB-treated)were free of any symptoms during weeks 1 and 2. By week 3, all four positive controls exhibited slight to moderate erythema .

Challenge Phase: No symptoms of erythema or edema were observed in any test animal throughout the 72-hour observation period.

All four positive controls exhibited slight to severe erythema and/or edema throughout the 72-hour observation period.

D. STUDY DEFICIENCIES

None

E. CONCLUSIONS

Based on the data described above, the test substance is not considered to be a contact sensitizer. Classification: Acceptable; no additional data are required.

VIII. HYPERSENSITIVITY INCIDENTS; 152-16 (MRID 44517006)

According to the registrant, approximately 21 research institutes and universities and 13 commercial establishments have used and/or conducted research on methylcyclopropene (MCP). Approximately 4100 person hours of MCP exposure have been experienced by humans without any known MCP-induced health related problems being reported.

IX. MUTAGENICITY; 152-19 (SALMONELLA REVERSE MUTATION ASSAY; MRID 44464709).

A MATERIALS

Test Compound

Test substances:	EthylBloc (MCP); purity not specified, but is 0.43% a.i. according to the CSF [dated 11/97 (prepared in DMSO for the assays)]
Lot No.:	F2428-31
pH	N/A
Physical description:	White powder
Storage Conditions:	Room temperature
Exogenous metabolic Activation System:	Arochlor™-induced rat liver mammalian microsomal enzymes (aka S9 reaction mixture).
Test organisms:	*Salmonella typhimurium* (tester strains: histidine auxotrophs TA98, TA100, TA1535, and TA1537) Source: Carol Wehr, Dept. of Biochemistry, University of CA, Berkeley.

Stock cultures: Grown fresh for each assay. Frozen stock for each strain was thawed and inoculated into sterile nutrient broth, incubated overnight at 37 ± 2°C.

Negative controls: Tester strains were plated with DMSO in the presence and absence of S9.

Positive controls: All positive controls were dosed at 100 μL/plate. With S-9: 2-aminoanthracene (with all four strains); without S-9: 2-nitrofluorene (10 μg/mL with TA-98), sodium azide (5 and 100 μg/mL with TA1535 and TA100, respectively), and 9-aminoacridine (800 μg/mL with TA1537)

Replication: Each strain was treated with six concentrations of test substance; all controls and test groups were plated in triplicate.

Non-activated Assay: Top agar, with 0.5 mM histidine/0.5 mM biotin per 1.0 mL of agar was used as an overlay; maintained at 42-48°C until use. The overlay consisted of 2 mL of molten top agar, 0.1 mL of a tester strain, 0.1 mL of test or control substance, and 0.5 mL of phosphate buffer (pH 7.4). The overlay was vortexed, poured onto minimal agar glucose plates, and incubated at 37 ± 2°C for 65 ± 2 hours. Plates were checked for uniform background lawns and the number of revertant colonies counted.

Metabolic Activation Assay: Samples requiring metabolic activation contain 10 mL of S9 reaction mixture (0.2 mL 0.4 M $MgCl_2$/1.65 M KCl; 0.05 mL 1 M glucose-6-phosphate; 0.4 mL 0.1 M NADP; 5.0 mL 0.2 M phosphate buffer [pH 7.4]; 3.35 mL water; and 1.0 mL S9). Top agar was prepared as previously described, except that 0.5 mL S9 reaction mixture was substituted for phosphate buffer.

B. TEST PERFORMANCE

Range Finding Study:

Dosing: The test substance was used at 1000, 1000, 100, 10, 1, and 0.1 μg/plate using strain TA100 and negative control plates in the presence and absence of S9 Any reduction in the degree of survival of treated cultures was used as a measure of toxicity.

Mutagenicity Study:

Dosing: Same as described for the Range-finding study (see above). Data were statistically analyzed by Murray's Pharmocological Calculations Procedure, analysis of variance (ANOVA), and the Newman-Keuls Test for confirmation of pairwise comparisons. A statistically significant (p <0.05) increase in mutation frequency of the test substance when compared to the negative control was required to demonstrate a positive dose response. A confirmatory assay was used to verify the results of the reverse-mutation assay.

C. RESULTS

No toxicity was observed in the range-finding study and no statistically significant increases in the number of revertant colonies was observed in the reverse-mutation assay. All positive controls demonstrated a significant increase in revertant colonies, indicating that the test substance was functional with known mutagens. No dose-related increase in revertant colonies was observed with the test substance in any of the *S. typhimurium* strains (in the presence or absence of S9).

D. Based on the data from the study, MC P is not a mutagenic agent.

IX. MUTAGENICITY; 152-19 (MUTAGENICITY TEST ON MCP IN THE L5178Y TK +/-MOUSE LYMPHOMA FORWARD MUTATION ASSAY; MRID 44496118).

A. MATERIALS

Test Compound

Test substances:	EthylBloc™ (0.225% MCP)
Lot No.:	F3429
Physical description:	White powder
Storage Conditions:	Room temperature
Exogenous metabolic Activation System:	Arochlor™-induced rat liver mammalian microsomal enzymes (aka S9).
Test cells:	Mouse lymphoma L5178Y cell line, heterozygous at the TK (thymidine kinase) locus, clone 3.7.2C. Source: Dr. Donald Clive
Storage:	Stock cultures are stored in liquid nitrogen. All laboratory cultures were maintained in log growth by serial subculturing for up to 4

months and were then replaced by cells from the frozen stocks. Cultures were incubated at 37°C. Cells were periodically tested for mycoplasma contamination and karyotype. Three to eight days before use, cell cultures were maintained in a cleansing medium for one day, a recovery medium for one day, and returned to normal growth medium.

Media: Culture medium: RPMI 1640 supplemented with Pluronic® F68, L-glutamine, sodium pyruvate, antibiotics, and heat-inactivated horse serum (10% by volume). Treatment medium: Fischer's medium (using same supplements described above, except that horse serum concentration was 5%). Cloning medium: Same as culture medium, except horse serum was 20%, there was no Pluronic® F68, and BBL purified agar was added to achieve a final concentration of 0.24%. Selection medium: Same as cloning medium plus 3μg/mL of TFT (5-trifluorothymidine).

Negative (untreated) controls: Cells unexposed to the test substance that were carried through all assay procedures. In the activation portion of the assay, negative controls were exposed to S9 activation mixture Single cultures were used to assay for cytotoxicity.

Negative (vehicle) controls: 1% DMSO was in all (with and without S9) cultures. DMSO was the vehicle of choice as a diluent for the test substance. Single vehicle control cultures were initiated in the range-finding study and three vehicle controls were initiated in the mutation assay

Positive controls: Methyl methanesulfonate (MMS) was used as a control at 5 and 10 nL/mL in nonactivation mutation studies. Methylcholanthrene (MCA) was used as a control at 2.0 and 4.0 μg/mL in S9 metabolic activation studies.

B. TEST PERFORMANCE

General:

Treatment media that contained the test substance at the final concentration were prepared by making 1:100 dilutions from the primary stocks (100x the highest desired concentration in DMSO) into the treatment media. The DMSO volume used in the activation assays was reduced to compensate for

the volume of S9 used. Treatment cultures consisted of 6.0 x 10^9 cells/10.0 mL. Fresh solutions of test substance were prepared daily for biological testing.

Range Finding Study:

A preliminary dose range-finding study was conducted, with and without S9; five doses were used, starting at 5000 μg/mL of test substance followed by four lower concentrations. Exposure time was 4 hours at 37°C in a shaker at 80 ± 10 rpm, followed by washing (twice) and resupension in growth medium. The cells were then incubated overnight and cell counts were made and compared to concurrent vehicle controls. The maximum applied dose chosen for the mutagenicity study was 5000 μg/mL or, if precipitation occurred, the maximum dose applied was at least twice the solubility limit of the test substance in culture medium.

Mutagenicity Study:

The Nonactivation assay consisted of three vehicle controls, two positive controls, and seven test substance dose concentrations (1.57 to 50 μg/mL) in the treatment medium. Cells were obtained from logarthmically growing stock cultures and seeded into tubes at 6.0 x 10^9 cells/tube. The cells were pelleted by centrifugation, resuspended in 10 mL of treatment medium and incubated for 4 hours at 37°C in a shaker at 80 ± 10 rpm, followed by washing (twice) and resupension in 20 mL growth medium. The tubes were then returned to the shaker as closed-tube cultures. An expression period of two days was used to allow recovery, growth and expression of the TK -/- phenotype (a mutation). Cell densities were determined 24 hours after treatment. A sample of 3.0 x 10^6 cells/mL was suspended in the selection medium to recover mutants. This sample was distributed to three culture dishes (3.0 x 10^6 cells/dish) containing cloning medium and incubated 10-14 days in 5% CO_2 at 37°C. At the end of the incubation period, colonies/plate were counted. Two nonactivation assays were conducted.

The Activation assay was conducted concurrently with the Nonactivation assay. The assays are identical, except that the S9 reaction mixture is added during the 4-hour exposure period.

C. RESULTS

In the Range-Finding Assay, the test substance was shown to be nontoxic up 2500 μg/mL and weakly cytotoxic at 5000 μg/mL.

In the Nonactivation and Activation assays, no significant toxicity was observed and there was no significant increase in mutants relative to controls; no dose-response effects were observed. Positive controls (MMS for nonactivation, and MCA for activation) induced large increases in mutant frequency

D. Based on the data from the study, MCP is not a mutagenic agent.

X. MUTAGENICITY TEST (152-19) ON MCP IN AN *IN VIVO* MOUSE MICRONUCLEUS ASSAY; MRID 44464711.

A. MATERIALS

Test Compound

Test substances:	EthylBloc™ (0.225 % MCP);
Lot No.:	F3429
pH	N/A
Physical description:	White powder
Storage Conditions:	Room temperature
Control vehicle:	Deionized water
Positive control:	Cyclophosphamide

Test animals:	Mice, Crl:CD-1®(ICR) BR. Young adult male and female
Number:	30 (Range-finding study); 110 (micronucleus study)
Age:	Approximately 8 weeks
Weight:	Micronucleus study: 28.8-35.1 g, males; 20.2-26.1 g, females
Source:	Charles River Laboratories, Raleigh, NC (micronucleus study).
Housing:	5/cage for dose selection; 7/cage for (micronucleus study)
Temperature:	72 ± 6° F
Humidity:	55 ± 15%
Photoperiod:	12 hours light/dark cycle
Food:	Purina Certified Laboratory Pellets #5002
Water:	Tap water *ad libitum*

B. TEST PERFORMANCE

Micronucleus Study:

Based on the range-finding study data, dose levels of 1250, 2500, and 5000 mg/kg of test substance were chosen for the micronucleus study. The positive control substance , cyclophosphamide (CP) was dissolved in deionized water prior to administration. Ten mice (5 male/5 female) were randomly assigned to each dose and termination time group. Mice dosed with the test substance and vehicle control (deionized water) were terminated at 24, 48, and 72 hours postdosing. Mice dosed with the positive control (CP) were terminated at 24 hours postdosing. Mice were terminated by euthanizing with CO_2. After termination, hard limb bones were removed for marrow extraction. The bone marrow was transferred to tubes containing 3-5 mL bovine serum (one tube/mouse). Marrow was pelleted by centrifugation, the supernatant aspirated, and portions of the pellet were spread on slides. After drying, slides were fixed in methanol, stained in May-Grünwald Solution followed by Giemsa, and mounted with a coverslip. Slides were scored for micronuclei and polychromatic erythrocyte (PCE) to normochromatic erythrocyte (NCE) cell ratio; 1000 PCEs/mouse were scored.

C. RESULTS

No bone marrow toxicity (measured as a decrease in PCE:NCE ratio) was observed for any dose of test substance. There were no induced increases in micronucleated PCEs relative to vehicle controls. The positive control (CP) induced significant increases in PCEs.

D. Based on the data from the study, MCP is not a mutagenic agent.

13544

R141546

Chemical: Cyclopropene,1-methyl-

PC Code:
224459

HED File Code: 41500 BPPD Tox/Chem
Memo Date: 12/23/1998
File ID: DPD249432
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